The Dual Role of Public Debt in Morocco's Investment Dynamics: Empirical Evidence

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Abstract

This study examines the effect of public debt on investment performance in Morocco over the period 1990–2024. Gross fixed capital formation serves as the dependent variable, while public debt, government expenditure, inflation, and population growth are used as explanatory variables. Using the Autoregressive Distributed Lag (ARDL) approach, the analysis captures both short-run and long-run dynamics. The results reveal that in the long-run, public debt has a negative and statistically significant effect on investment, which suggests that excessive indebtedness challenges capital formation. In the short-run, only public debt has a temporary positive impact that fades over time. The negative and highly significant error correction term confirms a stable long-run relationship between the variables. Diagnostic tests indicate that the model is free from serial correlation, heteroskedasticity and instability. Globally, the findings underscore that while debt can initially stimulate investment, sustained debt accumulation could hinder it, highlighting the importance and need for prudent debt management and more efficient use of borrowed resources in Morocco. These outcomes suggest that an appropriate composition of public debt and efficient public investment management is crucial for sustaining private investment and long-term

economic growth in Morocco, providing policy-relevant insights for fiscal authorities seeking to balance debt sustainability with investment-led development.

Keywords: Public debt, investment, ARDL model, fiscal policy, Morocco

Introduction

In recent years, particularly in the wake of the COVID-19 crisis, the global economy has faced significant and persistent fiscal pressures, rising public debt levels, and structural challenges. With global public debt reaching unprecedented levels, understanding its implications for productive investment and long-term economic performance has become increasingly critical. According to the International Monetary Fund (IMF), global public debt reached approximately USD 98 trillion by the end of 2024, representing about 94% of global GDP, and is projected to approach 100% of GDP by 2030. This situation reflects the cumulative effects of sustained fiscal deficits—averaging around 5% of global GDP—driven by post-pandemic recovery measures, increased social spending, and rising debt-servicing costs. Although private borrowing has declined in some economies, governments worldwide continue to rely heavily on public debt to finance investment and social expenditure.

Within this global context, Morocco faces similar fiscal challenges. Public debt reached around 70% of GDP in 2024, a level that exceeds prudential thresholds commonly recommended by international institutions. Although this level of public debt is partly associated with large-scale investments in infrastructure, energy, and industrial development, several analysts, including El Moussaoui (2025), warn that Morocco's rising debt heightens vulnerability to external shocks and highlights the need for improved fiscal governance (World Bank, 2024). Despite these challenges, investment remains a central pillar of Morocco's development model. Gross fixed capital formation reached one of the highest levels in the region, accounting for 28.8% of GDP in 2023, with public investment representing approximately 9% to 10% of GDP. In contrast, private investment has expanded more slowly due to financing constraints and regulatory barriers.

Despite growing attention from policymakers and researchers to public debt dynamics, empirical evidence regarding the effect of public debt on investment remains mixed. Some studies associate debt accumulation with enhanced productive capacity, particularly when borrowing is directed toward infrastructure and capital formation, as highlighted by Marmullaku et al. (2021) and Tarawalie et al. (2021). In contrast, other studies, such as Mendonça (2021), Picarelli et al. (2019), and Islam (2024), report a negative impact of public debt on both public and private investment, especially in

highly indebted economies. Additional research points to a non-linear relationship, suggesting that debt may stimulate investment below certain thresholds but become detrimental once these levels are exceeded (Penzin et al., 2022). However, these findings remain divergent. Moreover, a substantial part of the literature focuses primarily on the public debt–growth nexus, treating investment mainly as a transmission channel rather than as a central outcome variable.

Despite the extensive empirical literature on public debt and macroeconomic performance, several important gaps remain, particularly in the Moroccan context. Existing studies predominantly rely on cross-country panel analyses or concentrate on economic growth, providing limited Morocco-specific evidence on the direct impact of public debt on investment. Furthermore, few studies explicitly distinguish between short-run and long-run effects of public debt on investment, despite the relevance of such dynamics for economies experiencing sustained fiscal expansion. In addition, the debt–investment relationship in Morocco has rarely been examined over a long time horizon that captures major macroeconomic shocks, including recent post-crisis periods.

To address these gaps, this study analyzes the impact of public debt on investment performance in Morocco over the period 1990–2024, using gross fixed capital formation as the central dependent variable. By employing the Autoregressive Distributed Lag (ARDL) approach, the analysis captures both short-run and long-run dynamics, allowing for the identification of the dual role of public debt. Beyond contributing to the Moroccan case, this study also offers insights relevant to other emerging economies seeking to reconcile debt sustainability with long-term investment-led growth.

This paper is structured as follows. The next section reviews the relevant literature, followed by the model specification, data sources, and estimation methodology. The empirical results are then presented and discussed, before concluding with key findings and policy implications.

Literature review

The relationship between public debt and investment has generated divergent findings among economists. While some argue that public debt can stimulate productive investment when used efficiently, others highlight that excessive debt levels may hinder capital formation and, consequently, economic growth.

A body of literature highlights the positive role of public debt in stimulating investment, particularly when borrowed funds are allocated to productive expenditures. In this context, debt-financed investment can improve the economy's productivity through the increase of the marginal productivity of private capital and labor. This expansion of productive

potential can, in the long-term, stimulate private investment and consumption, as improvements in infrastructure tend to enhance efficiency and reduce the costs of production across the economy. As shown by Leduc et al. (2013), well-targeted and public investments financed by debt can lead to positive effects on economic activity, supporting sustainable long-run growth. On the same perspective, Tarawali et al. (2021) find that external debt represents an additional source of capital, fulfilling the financing gap faced by developing economies, which helps promote investment and economic growth. Within this framework, a moderate and well-managed level of public debt can serve as a complementary financial tool that supports productive capital accumulation. Evidence from a study on a sample of European transition economies from 1995 to 2017, done by Marmullaku et al. (2021), reinforces this perspective by finding that public debt positively influences economic growth through public investment, suggesting that borrowing can be an effective tool for financing capital formation in emerging economies. They concluded that financing capital investment through public debt levels can lead to greater economic growth by expanding investment under certain appropriate fiscal conditions. However, Penzin et al. (2022) identify a non-linear relationship between public debt and private investment in emerging economies. Using a threshold regression model, they find that below a threshold of 3%, public debt exerts a positive effect on private investment by financing productive activities and improving macroeconomic conditions. Their findings suggest that low, well-managed and controlled debt ratios can generate a crowding-in effect that supports investment and economic growth, before a reverse effect occurs when public debt exceeds the threshold. In a similar non-linear perspective, Kamiguchi (2023) finds that when an economy is dynamically inefficient, that is, when the growth rate exceeds the return on capital, investments financed through debt can improve economic growth by increasing productivity. By contrast, in a dynamically efficient economy, where the growth rate is lower than the return on capital, debt-financed public investment can hinder economic growth unless public capital generates high productivity gains. Consistent with this view, Mabula et al. (2019) show that public debt can have a dual effect; it may crowd-in private investment when used to finance infrastructure, but it can also crowd-out private investment. High public debt ratios force the government to increase future taxes to service the debt.

While moderate levels of public debt can stimulate productive investment, a growing body of empirical evidence highlights the adverse effects of excessive debt on investment performance. Elevated debt burdens can reduce the government's ability to finance new investments or respond to economic shocks, crowd out private capital and weaken public investment capacity, that way constraining long-term economic activity. For instance

Mendonça (2021), employ a panel of 24 emerging economies from 1996 to 2018, finds that increases in the debt-to-GDP ratio lead declines in both public and private investment, with the effect being intensified after the 2007-2008 global financial crisis. The author attributes this result to rising debt-servicing costs and tighter fiscal constraints, which limit the government's capacity to sustain public sector investment. In a similar perspective, Picarelli et al. (2019) report that for every 1% increase in public debt, public investment declines by 0,03%, particularly in countries with already high debt ratios. These results support the crowding-out effect, where debt accumulation diverts resources away from productive capital formation. Furthermore, Islam (2024), using multi-wave firm-level panel data from developing economies, shows that higher public debt ratios significantly reduce private investment, particularly when increased government indebtedness challenges the access of firms to credit. The study also identifies a transmission channel where rising debt levels lead governments to increase taxation and administrative controls to finance debt servicing, creating fiscal and bureaucratic burdens that discourage private investment, especially for small and medium-sized enterprises. Focusing on the region of Eastern Africa, Otieno (2024) uses a Spatial Durbin Fixed-Effects (SDM-FE) model and finds that external public debt has a negative spillover influence on regional growth activity. The results also indicate that excessive borrowing reduces both domestic and foreign investment by reducing fiscal space, raising interest rates, and increasing macroeconomic uncertainty. The study recommends the need for prudent debt management to support investment and ensure stable economic growth in interdependent regional economies. In a more country-specific analysis, Çerpja (2024) finds that external public debt impacts negatively and significantly public investment in Albania in the long-run, while internal debt remains insignificant. The author attributes this outcome to the fact that external debt may hinder capital formation when it is not directed toward productive sectors.

These findings are consistent with the findings of Ncanywa (2018), who used an ARDL, Granger-causality, impulse-response and variance-decomposition techniques to report that public debt impacts negatively on investment in South Africa. The study also identifies a bidirectional causal relationship between public debt and growth, suggesting that high debt levels slow growth, which in turn intensifies fiscal pressures.

Globally, this body of literature dives into one conclusion, the fact that elevated public debt levels tend to decrease investment performance. This finding is commonly explained by the financial crowding-out effects, reduced fiscal space for productive investment, increased regulatory and administrative burdens and heightened macroeconomic uncertainty.

Overall, the literature reveals that the effect of public debt is not uniform but depends on its level, composition and the way in which borrowed funds are allocated and managed.

Data and methodology
Data and model specification

The study examines the effect of public debt, government expenditure, inflation and population growth on investment in Morocco. In line with previous empirical studies such as Çerpja et al. (2024) and Ncanywa et al. (2018), gross fixed capital formation (GFCF) is employed as a proxy for investment, as it reflects capital accumulation through expenditures on fixed assets that boost productive capacity. Public debt is included as the main independent variable to capture the government's fiscal stance and its reliance on borrowing to finance expenditure and investment. Government expenditure is employed to account for the role of fiscal policy in supporting aggregate demand and public infrastructure, while inflation is used to reflect macroeconomic stability, as price fluctuations influence investment decisions through uncertainty and real interest rates. Finally, population growth is included to capture demographic pressures that may affect investment requirements and per capita capital formation. The data are collected on an annual basis from the World Development Indicators (WDI, 2025) and the International Monetary Fund (IMF, 2025) databases over the period from 1990 to 2024. Table 1 offers a detailed summary of the variables and their sources, while Figure 1 illustrates the yearly trends of the variables employed in the analysis. The following model represents the empirical assessment of the analysis:

$$GFCF_t = \alpha_0 + \alpha_1\, DBT_t + \alpha_2\, GOVEX_t + \alpha_3\, INFL_t + \alpha_4\, POP_t + \varepsilon_t.$$

Where $GFCF_t$ indicates gross capital formation, used as the dependent variable, DBT_t represents the general government gross debt, $GOVEX_t$ refers to general government final consumption expenditure, $UNEMP_t$ stands for unemployment, $INFL_t$ represents inflation measured by consumer prices and POP_t refers to population growth.

Table 1: A summary of the parameters and their sources.

Parameter	Description	Source
GFCF	Gross capital formation (% of GDP)	World Bank (WDI)
DBT	General governmement gross debt (% of GDP)	International Monetary Fund (IMF)
GOVEX	General government final consumption expenditure (annual % growth)	World Bank (WDI)
INFL	Inflation, consumer prices (annual %)	World Bank (WDI)
POP	Population growth (annual %)	World Bank (WDI)

GFCF over time

Government debt overtime

Gross fixed capital formation overtime

Inflation over time

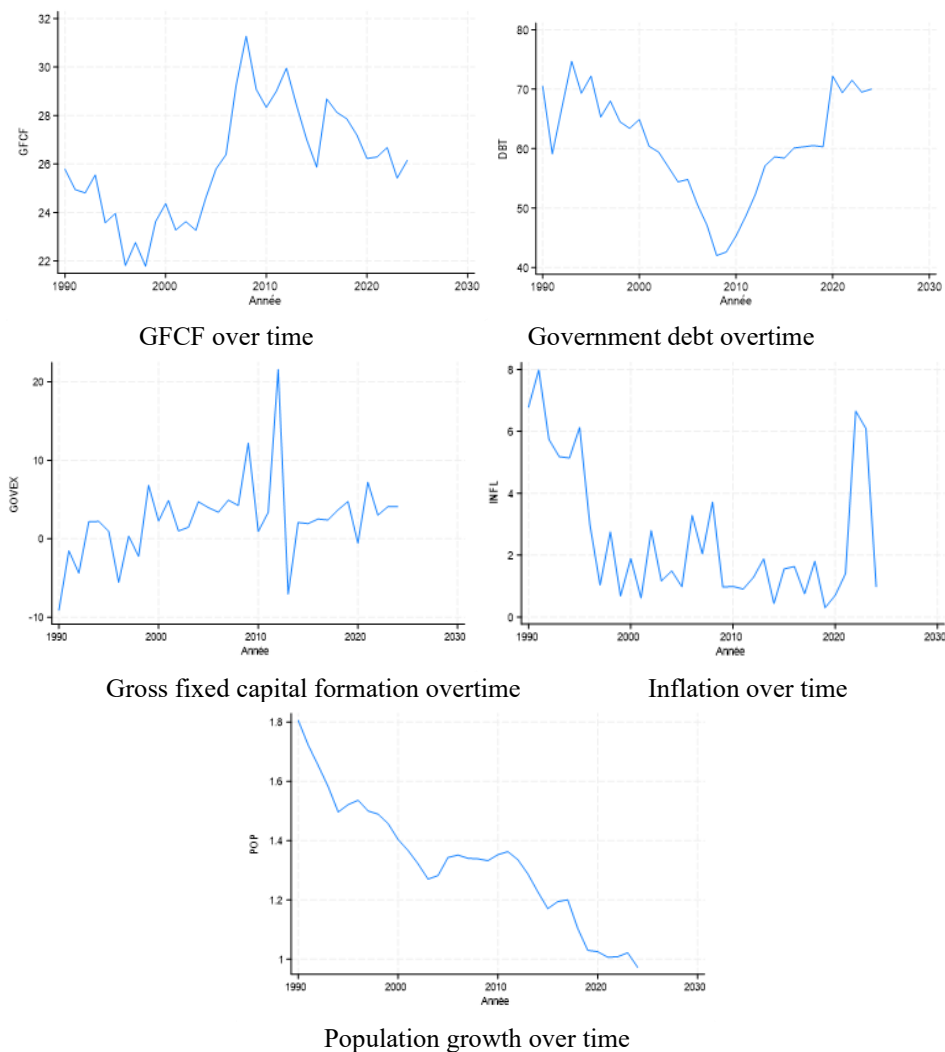Population growth over time
Fig. 1. Yearly trends of the variables

Methodology

Figure 3 presents the step-by-step methodological framework used and followed to perform this study. The first step of the analysis is based on the testing of the stationarity of the data. Implementing unit root tests is a crucial and necessary step, as it helps prevent misleading regression findings. However, the effectiveness of unit root tests can depend highly on sample size. Therefore, the use of multiple tests is recommended to reduce the possibility of misinterpreting the integration characteristics of the time series (Raihan & al.2025). To confirm the integration order of the variables and rule out I(2) processes, both the Augmented Dickey–Fuller (ADF) test (Dickey & Fuller, 1979) and the Phillips–Perron (PP) test (Phillips & Perron, 1988) have been

mobilized. After the verification of stationarity, we proceeded to the estimation of the ARDL bounds cointegration test introduced by Pesaran & al. (2001). This approach gives the ability to confirm the existence of a long-term relationship between the variables and accommodates regressors integrated of different orders, specifically I(0) and I(1). We used the Stata ardl command to estimate the ARDL model, applying the Akaike Information Criterion (AIC). The use of AIC ensures an optimal balance between model fit and parsimony while reducing the risk of over-parameterization. A maximum of four lags is permitted to capture the dynamic structure of the variables while preserving degrees of freedom. Moreover, although potential endogeneity concerns may arise in the relationship between public debt and investment, the ARDL framework helps mitigate this issue by incorporating lagged values of the explanatory variables and allowing for dynamic adjustments over time, thereby reducing simultaneity bias. The bounds test examine the null hypothesis of no long-run relationship using the F-statistic. If the value of F-statistic appears to be greater than the critical bounds, the null is rejected and the existence of cointegration is confirmed.

The following equation represents the ARDL bounds test:

$$\Delta GFCF_t = \sum_{i=1}^{p} a_i \Delta DBT_{t-i} + \sum_{j=o}^{q_1} \beta_j \Delta GOVEX_{t-j} + \sum_{i=0}^{q_2} \beta_i INFL_{t-i}$$
$$+ \sum_{l=o}^{q_3} \beta_l \Delta POP_{t-l} + \alpha_1 GFCF + \alpha_2 DBT + \alpha_3 GOVEX$$
$$+ \alpha_4 INFL + \alpha_5 POP + \varepsilon_t$$

Δ refers to the first-difference operator, The coefficients $a_i, \beta j, \beta_i, \beta_l$ refer to the short-run dynamic coefficients, while α_1 to α_6 denote the long-run relationship coefficients, ε_t denotes the error term. Once the cointegration is established, the long-run coefficients are obtained from the level terms in the ARDL model, while the short-run dynamics are from the differenced terms. The Error Correction Term (ECM) is included to indicate the speed of adjustment toward the long-run equilibrium after a disturbance. Jarque-Bera test is employed to verify the normality of residuals, Breusch-Godfrey LM is used to test autocorrelation, and Breusch-Pagan is applied to examine the heteroskedasticity. Moreover, we conduct the cumulative sum of squares test (CUSUMQ) to assess the stability of the ARDL model over the period of study.
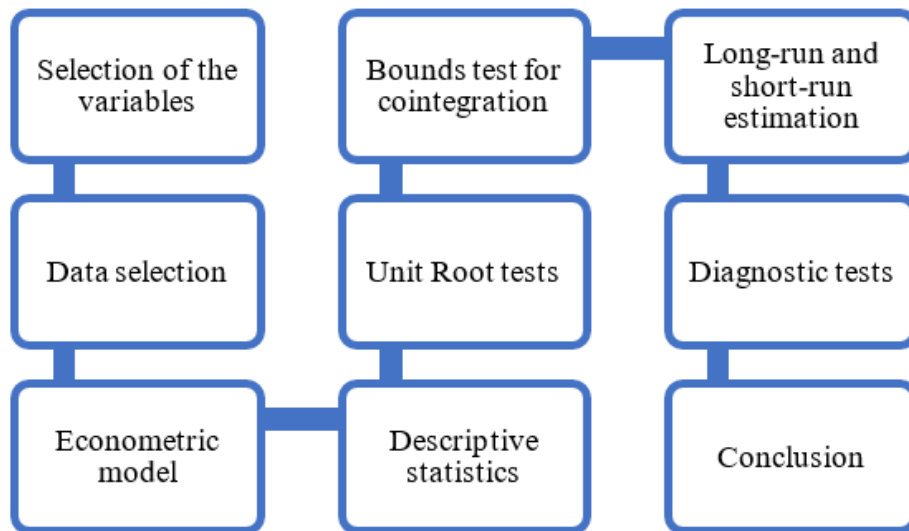
Figure 2: Flowchart of the study

Results and discussion

Table 2 presents the descriptive statistics for the variables employed in the study. The results show that gross fixed capital formation has an average value of 26.02% of GDP, with a standard deviation of 2.38%, suggesting moderate fluctuations in investment activity. The minimum and maximum values, 21.78% and 31.27%, respectively, indicate that Morocco experienced both periods of lower and higher capital accumulation during the study period. Public debt records a mean of 60.61% of GDP, with a standard deviation of 8.87%, and values ranging between 42% and 74.7%, highlighting a relatively high but variable debt ratio. Government expenditure averages 2.47%, with a standard deviation of 5.24% and extreme values between –9.10% and 21.57%, reflecting strong fiscal variations over time. Regarding inflation, the mean value stands at 2.59%, with a standard deviation of 2.19%, and a range between 0.30% and 7.99**%**, indicating moderate but noticeable price volatility. Finally, population growth presents a mean of 1.33%, a low standard deviation of 0.21%, and values varying between 0.97% and 1.81%, illustrating steady demographic dynamics in Morocco throughout the observation period.

Table 2: Descriptive Statistics

Parameter	Mean	Std. Dev	Min	Max
GFCF	26.02033	2.375884	21.78203	31.26829
DBT	60.60571	8.870007	42	74.7
GOVEX	2.473179	5.237959	-9.101539	21.57288
INFL	2.594138	2.190673	0.303386	7.986166
POP	1.326268	0.2084438	0.9728276	1.80544

Table 3 reports the results of the unit root tests performed using both the Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) methods to assess the stationarity of the variables. The results reveal that government expenditure is stationary at level, indicating integration of order I(0), with both ADF and PP tests showing significance at conventional levels. Meanwhile, gross fixed capital formation and public debt are non-stationary at level but become stationary after first differencing, confirming their integration of order I(1). The same case goes for inflation and population growth, they are also integrated of order I(1), as both series only achieve stationarity after first differencing under the two tests.

Overall, the outcomes confirm a mixture of I(0) and I(1) variables, with no variable integrated of order two I(2). This justifies the use of the Autoregressive Distributed Lag (ARDL) model, which is suitable for datasets containing variables that are either stationary at level or at first difference.

Table 3: Unit Root Test Results (ADF and PP).

Parameter	Test type	Level (p-value)	First Difference (p-value)	Order of Integration
GFCF	ADF	0.7268	0.0063	I(1)
	PP	0.6140	0.0000	
DBT	ADF	0.9729	0.0152	I(1)
	PP	0.9059	0.0000	
GOVEX	ADF	0.0021		I(0)
	PP	0.0000		
INFL	ADF	0.1222	0.0003	I(1)
	PP	0.0921	0.0000	
POP	ADF	0.1774	0.0028	I(1)
	PP	0.2100	0.0153	

Table 4 displays the results of the ARDL bounds test for cointegration. The results show that F-statistic value of 4.796 exceeds the upper critical bound value of 4.01 at the 5% significance level, which leads to the rejection of the null hypothesis of no long-run relationship among the variables. This result confirms the existence of a stable long-run cointegration between gross fixed capital formation and the explanatory variables included in the model.

Table 4: Bounds Test for Cointegration

Test statistic	Value	I(0) Bound	I(1) Bound	Conclusion
F-statistic	4.796	2.86	4.01	Cointegration exists
K=4				

Table 5 presents the detailed results of the ARDL estimation, revealing both the long-run and short-run links between gross fixed capital formation and its explanatory variables.

In the long-run dynamic, the outcomes indicate that public debt has a statistically significant and negative effect on investment, with a coefficient of

–0.2407 significant at the 1% level, which implies that a 1 percentage point rise in the debt-to-GDP ratio is associated with a decline in investment by approximately 0.24 percentage points in the long-run. This finding suggests that rising public debt discourages private and public investment in Morocco over the long-term, possibly due to crowding-out effects, higher interest rates, or the redirection of resources toward debt servicing rather than productive capital expenditure, this results goes hand in hand with the ones found by Asif & al. (2024) and Hakimi & al. (2019) and Mabula & al. (2019) who found that high public debt tends to crowd out private investment, since it imposes a great burden on the economy and leads to higher future taxation to finance debt servicing, which discourages private sector activity. Meanwhile, government expenditure exerts a positive influence on GFCF (0.1523), implying that public spending can stimulate investment activity by improving infrastructure and boosting aggregate demand. Similarly, inflation has a positive and significant coefficient, which indicates that moderate inflation may enhance investment performances in the long-run, as it can increase nominal returns and stimulate business activity when price expectations remain stable. In contrast, population growth has a negative and significant impact (–0.5074, significant at 5%), suggesting that rapid demographic expansion might reduce per capita investment or strain public resources, leading to reduced capital formation.

In the short-run, public debt presents a positive and significant relationship with investment (0.1362, significant at 5%), indicating that short-term borrowing can temporarily boost capital formation, which may reflect the trajectory of the borrowed value, in other way the financing of ongoing infrastructure projects or fiscal stimulus measures. However, this effect may not be persistent in the long-term if debt levels become unsustainable. Evidence from studies done on other countries such as the research of Tarawalie & al. (2021), who found that external debt is seen as capital that increases investment, bridges the financing gap, and promotes growth, and also Marmullaku & al. (2021) who have also found that public debt has a positive impact on growth and this is achieved through public investment. The non-existence of certain variables in the short-run estimation table is due to the optimal lag selection procedure of the ARDL model, which automatically excludes short-run dynamics that are statistically insignificant. This indicates that short-term variations in these variables do not contribute meaningfully to explaining investment fluctuations for the case of Morocco, their long-run effects remain significant.

The error correction term (ECM) has a negative and highly significant coefficient (–0.5070, $p < 0.01$), confirming the existence of a stable long-run equilibrium between GFCF and its determinants. The coefficient magnitude implies that approximately 50.7% of any disequilibrium from the previous

year is corrected within the current period, demonstrating a moderate adjustment speed toward equilibrium.

Finally, the model shows a strong explanatory power, with an R² of 0.8444 and an adjusted R² of 0.8085, indicating that about 81% of the variation in investment is explained by the independent variables. Overall, the results reveal that while short-term debt accumulation can stimulate investment, excessive debt amounts have a negative impact on Morocco's long-run investment capacity, to that can be added the fact that well-targeted government expenditure and moderate inflation may support capital formation.

Table 5: Results of ARDL long- and short-run analysis

Variables	Coefficient	t-Statistic	p-value
Long-run relationship			
DBT	-0.2406662 ***	4.75	0,000
GOVEX	0.1522971 *	1.72	0,097
INFL	0.4715598**	2.20	0,037
POP	-0.507377**	-2.35	0,027
Short-run dynamics			
DBT	0.1362082 **	2.73	0.011
Constant	23.13015 ***	4.01	0.000
Error Correction Term (ECM)	-0.5070044 ***	-4.35	0.000
R-SQUARED	0.8444		
Adjusted R-squared	0,8085		

Note: *p < 0.10, **p < 0.05, ***p < 0.01

Table 6 displays the findings of the diagnostic tests performed to evaluate the statistical reliability of the ARDL estimation. Firstly, the Jarque–Bera test for normality of residuals produced a statistic of 2.04 with a p-value of 0.36, which indicates that the residuals are normally distributed. Secondly, the Breusch–Godfrey LM test for autocorrelation, applied with two lags, yielded a Chi-square statistic of 2.017 and a p-value of 0.3647. This result fails to reject the null hypothesis of no autocorrelation, suggesting that the residuals are free from serial correlation. Finally, the Breusch–Pagan–Godfrey test reported a Chi-square statistic of 0.74 with a p-value of 0.3905, confirming the presence of homoscedasticity. Collectively, the findings of these diagnostic tests provide strong evidence that the ARDL model is well specified and statistically reliable.

Table 6: Diagnostic Tests

Test	Statistic	p-value	Conclusion (5%)
Jarque-Bera test	2.04	0.3600	Residuals normal
Breusch-Godfrey LM test (lag=2)	2.017	0.3647	No autocorrelation
Breusch-Pagan- Godfrey test	0.74	0.3905	Homoscedasticity

Figure 4 reports the result of the CUSUM of Squares (CUSUMQ) test used to assess the structural stability of the estimated ARDL model. The findings show that the CUSUMQ statistics remain within the 5% significance bounds over the entire sample period, which indicates the absence of abrupt structural breaks or sudden variance shifts. This outcome suggests that the estimated long-run relationship and short-run dynamics are stable over time, enhancing confidence in the robustness of the model's empirical results. Moreover, the smooth trajectory of the cumulative variance, without sharp deviations beyond the confidence limits, supports the validity of statistical inference in the time-series framework.

In addition to the CUSUMQ test, parameter stability was also examined using the CUSUM test. The findings indicate that the CUSUM statistics show some sensitivity during certain sub-periods of the sample. This behavior may reflect gradual adjustments in the estimated coefficients rather than structural instability, particularly given the long observation period (1990–2024), which encompasses major economic reforms, external shocks, and the COVID-19 crisis. Such gradual parameter variations are observed commonly in macroeconomic time-series data, especially over long samples, and do not necessarily undermine the validity of the long-run relationship.

Importantly, the stability confirmed by the CUSUMQ test reveals that any coefficient changes are progressive rather than driven by major regime shifts, supporting the reliability of the ARDL framework in capturing Morocco's investment dynamics. Overall, the robustness and stability diagnostics provide strong evidence that the main results, particularly the long-term negative effect of public debt on investment, are not driven by model instability but reflect Morocco's persistent structural characteristics of the economy.
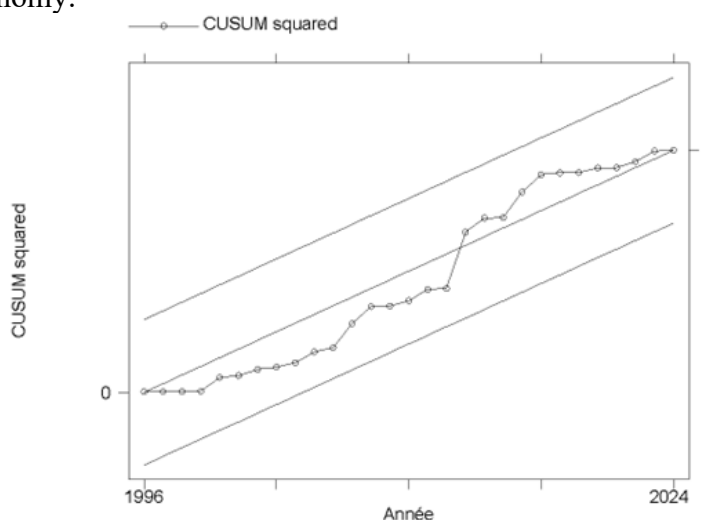

Figure 4: CUSUM of Squares Tests

Conclusion

Our study investigates the relationship between public debt, government expenditure, inflation, population growth and investment performance in Morocco over the period 1990 - 2024, using gross fixed capital formation as the dependent variable. The Autoregressive Distributed Lag approach was employed to capture both short- and long-run dynamics over the study period. As a preliminary step, the Augmented Dickey–Fuller and Phillips–Perron unit root tests were conducted, revealing a mix of I(0) and I(1) variables, thereby justifying the use of the ARDL model. The bounds test results confirmed the existence of a long-run cointegrating relationship between investment and its macroeconomic determinants.

In the long-run, the estimates indicate that public debt exerts a statistically significant and negative effect on GFCF, implying that higher debt ratios tend to crowd out productive investment in Morocco. Conversely, government expenditure and inflation exert positive effects, suggesting that productive public spending and moderate inflation can stimulate investment through improved infrastructure and higher aggregate demand. Population growth, however, exerts a negative and significant impact on investment, reflecting the potential strain of demographic pressures on capital formation and public resources. In the short-run, the results reveal a positive and significant relationship between public debt and GFCF, indicating that temporary borrowing may support investment financing, particularly for infrastructure projects. Nevertheless, this short-term benefit may not be sustainable if debt levels continue to rise without productivity gains. The negative and significant error correction term confirms a stable adjustment process toward the long-run equilibrium.

To assess the robustness of the estimated ARDL model, a series of diagnostic tests was carried out. The results of the Jarque–Bera, Breusch–Godfrey LM, and Breusch–Pagan–Godfrey tests confirmed that the residuals follow a normal distribution, indicated the absence of serial correlation and heteroskedasticity, respectively. Furthermore, the CUSUMQ tests demonstrated that the model's parameters remained stable over the entire sample period, reinforcing the validity of the long and short-run estimates.

Overall, these findings highlight the dual nature of public debt in Morocco's investment dynamics, while short-term borrowing can stimulate capital formation, excessive and persistent indebtedness undermines long-run investment potential. The findings of this study provide several important policy implications for Morocco in the context of rising public debt and investment-led development. The results highlight that the composition of public debt is crucial: debt-financed spending should be directed primarily toward productive investments such as infrastructure, energy, logistics, and industrial development, which are more likely to support capital formation and

crowd in private investment. In contrast, excessive reliance on debt to finance recurrent or low-productivity expenditures may weaken long-term investment performance.

Moreover, investment efficiency matters as much as debt levels. The negative long-run impact of public debt on investment underscores the need to strengthen public investment management through improved project appraisal, cost–benefit analysis, and monitoring mechanisms, ensuring that borrowed resources generate tangible productivity gains.

In addition, closer coordination between fiscal policy and investment planning is essential. Aligning public debt management with national investment strategies and medium-term budgetary frameworks would help maintain fiscal sustainability while supporting long-term growth objectives. Finally, avoiding prolonged dependence on debt-financed unproductive spending is critical to preserving fiscal space and reducing vulnerability to external shocks. Public debt should be used primarily to finance projects that yield tangible economic and social benefits, thereby strengthening Morocco's productive capacity and enhancing citizens' well-being. Future research could extend this analysis by incorporating institutional quality, fiscal transparency, and budget governance variables to better understand how governance frameworks shape the effectiveness of public debt and investment policies in Morocco.

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Data Availability: All data are included in the content of the paper.

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